



**CONESTOGA-ROVERS
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December 14, 2009

Reference No. 054046

Mr. David Garrett
Environmental Scientist
U.S. Environmental Protection Agency, Region 7
Air and Waste Management Division
RCRA Corrective Action & Permits Branch
901 N. Fifth Street
Kansas City, Kansas 66101

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DEC 15 2009

Dear Mr. Garrett:

Re: U.S. EPA's Comments
Draft Interceptor Well System Interim Corrective Measure (ICM)
Effectiveness Evaluation Dated June 30, 2009
Occidental Chemical Corporation
6200 Ridge Road, Wichita, Kansas
RCRA ID# KSD007482029

Conestoga-Rovers & Associates (CRA), on behalf of Occidental Chemical Corporation (OCC), has prepared responses to the United States Environmental Protection Agency (U.S. EPA) comments detailed in your letter dated September 24, 2009. For ease of your review, U.S. EPA's comments are reiterated below in italic print, followed by CRA's response.

General Comments

1. U.S. EPA Comment

The report does not discuss the non-aqueous phase liquids (NAPL) identified during previous groundwater sampling events, or the impact of NAPL on isoconcentration mapping and contaminant trend analysis. Because wells containing NAPL are typically not sampled, the sample point may be disregarded rather than considered a source area. The report must be revised to address the occurrence of NAPL.

Response

Agreed. The report has been revised to note that monitoring wells located within the main Facility boundaries and that contained NAPLs were typically not sampled; however, these areas are recognized as potential source areas due to the presence of NAPL in the wells.

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2. U.S. EPA Comment

The report is missing a discussion on the conditions of the interceptor wells (e.g., their efficiency, propensity for leakage, etc.). The report must be revised to address the condition of all interceptor wells, as well as any actions necessary to address unacceptable well conditions.

Response

We agree that an evaluation of the condition of the interceptor wells is needed; however, the primary objective of this report is to determine if the current groundwater interceptor network is effectively containing and capturing impacted groundwater. The interceptor well operations are monitored electronically with process logic controls (PLC) and associated operational alarms. Additionally, the interceptor wells and associated piping are visually inspected on a daily basis. Based on operating and maintenance data such as this, the condition of the interceptor wells and associated operating efficiency will be considered in subsequent evaluations. The report has been revised to identify this issue as one of the data gaps to be addressed.

3. U.S. EPA Comment

The report does not discuss monitoring well or piezometer conditions and the potential need for redevelopment or replacement to accurately gauge water levels and produce representative samples. The report must be revised to address the condition of the monitoring wells and piezometers as observed during the 2008 Appendix IX sampling event, as well as any actions taken or planned to address unacceptable monitoring well conditions observed during that sampling event.

Response

A comprehensive monitoring well condition inspection was completed during the first semi-annual groundwater monitoring event of 2009. The information collected during the inspection was summarized in a Monitoring Well Inspection Summary Report, which was included as Appendix C to the Semi-Annual Groundwater Monitoring Report, April 2009. It is OCC's intent that a final determination of any needed repairs to the monitoring well network will be developed once the details of the routine groundwater sampling program, including the wells to be sampled and an analytical parameter list, is finalized. As indicated in the response to General Comment number 2, additional operation and maintenance performance analysis, including monitoring well conditioning, will be addressed.



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Specific Comments

1. U.S. EPA Comment

Page 1, Section 1.1, Objectives. Section 1.1 indicates that the report will provide a "comprehensive evaluation of the current groundwater monitoring program"; however, no discussion is included regarding the siltation and well construction issues identified during the 2008 Appendix IX sampling event or how those issues will be rectified. Section 1.1 must be revised to state that OCC will ensure that the groundwater monitoring wells are functioning properly, and the report must be revised to specify how this will be accomplished.

Response

Please refer to the response to General Comment numbers 2 and 3. Additionally, the sections of the report which discuss the proposed ongoing groundwater monitoring program have been removed from this report. The recommendations for the proposed ongoing groundwater monitoring program will be submitted to the U.S. EPA in a separate report which will be submitted in 2010 following further discussions with U.S. EPA.

2. U.S. EPA Comment

Page 5, Section 2.1.2, Historical Waste Disposal. Section 2.1.2 identifies the waste streams associated with some, but not all, chemical manufacturing processes currently or historically occurring at the facility. Section 2.1.2 must be revised to discuss all facility-generated waste streams, waste disposal practices, and known releases of hazardous materials or petroleum products with the potential to impact groundwater. Additionally, Section 2.1.2 must be revised to clarify that the discussion is limited to those facility-generated waste streams, waste disposal practices, and known releases of hazardous materials or petroleum products with the potential to impact groundwater.

Response

Section 2.1.2 has been revised to include additional available information on chemical manufacturing processes and associated waste streams.

3. U.S. EPA Comment

Pages 5 and 6, Section 2.1.3, Overview of Investigation and Corrective Actions, and



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Pages 14 through 18, Section 3.0, Previous Hydrogeologic Studies. Sections 2.1.3 and 3.0 identify many, but not all, investigative and corrective actions taken to address groundwater contamination associated with the facility. However, neither section discusses contamination identified in neighboring residential drinking water wells or the actions taken to address that contamination. Section 2.1.3 or Section 3.0 must be revised to discuss all groundwater investigations and corrective actions associated with residential groundwater and the 2008 Appendix IX groundwater sampling effort.

Response

Section 2.1.3 has been revised to note that OCC has previously voluntarily conducted a residential water well sampling program. Details regarding the 2008 Appendix IX sampling are provided in Section 5.2.1.

4. U.S. EPA Comment

Page 17, Section 3.4, 1996-2000 Camp Dresser & McKee. Section 3.4 refers to an August 2000 Camp Dresser & McKee report entitled Capture Zone Modeling. The EPA never received this report from Vulcan Chemicals; therefore it was never reviewed or approved by EPA. The ICM Effectiveness Evaluation Work Plan should be revised to acknowledge that neither EPA nor KDHE was allowed an opportunity to review this report. In addition, the Well ICM Effectiveness Evaluation Work Plan should be revised to include a section, or an attachment that provides the tests, studies and recommendations from the 2000 capture zone report.

Response

A copy of the referenced report was provided to the EPA on May 12, 2009 by OCC. As to this report, its findings are only discussed as a historical footnote, since the conditions evaluated in 2000 are no longer representative of the 2009 Site conditions assessed by the 2009 ICM Effectiveness Report.

5. U.S. EPA Comment

Page 18, Section 3.5, 2001-Present Shaw Environmental, Inc. Section 3.5 indicates that the confirmation laboratory results for the 2009 off-site Geoprobe groundwater investigation were all non-detect; however, the original mobile laboratory results are not discussed. Section 3.5 must be revised to describe the results of the mobile laboratory analysis, as well as the confirmation laboratory results because only a percentage of the overall samples were sent to the confirmation laboratory for analysis.



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Response

The report has been revised to discuss the groundwater screening mobile laboratory results as well as the confirmatory laboratory results.

6. U.S. EPA Comment

Page 21, Section 4.3.1, Overview. Section 4.3.1 indicates that brine is extracted as a raw material from off-site wells screened in the uppermost bedrock unit. The locations of these extraction wells are not indicated, and it is not discussed whether extraction from these wells could influence groundwater or contaminant migration in the S1 aquifer unit. Section 4.3.1 must be revised to discuss the locations of the brine wells and whether withdrawal from these wells could influence groundwater and contaminant movement in the S1 aquifer unit.

Response

Section 4.3.1 has been revised to provide additional details on the location of the brine wells, the construction of these wells, and a discussion noting that the operation of these wells does not have any hydraulic influence on the overburden aquifer in the vicinity of the Site (the brine wells are located approximately 7 miles away from the OCC plant).

7. U.S. EPA Comment

Page 22, Section 4.3.2, Regional Pumping History and Page 31, Section 5.5, Regional Hydraulic Stresses. Sections 4.3.2 and 5.5 describe current and historical pumping wells, both on site and off site; however, no figure is provided showing the locations of all these wells. The report must be revised to include a figure of all current and historical pumping wells with information regarding their pumping rates and the years that they were actively used.

Response

The report has been revised to include a figure identifying the approximate locations for the surrounding wells for which information is available. The report has also been revised to include available well logs and information regarding the pumping rates of these wells and the years that they were actively used. Many of these wells are or were owned and operated by third parties, so available information is limited.



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8. U.S. EPA Comment

Page 25, Section 4.5.1, Discontinuous Perched Water Areas and Page 65, Section 10.1, Step 1 Evaluation. Sections 4.5.1 and 10.1 incorrectly state that wells screened in perched water areas cannot be used reliably "to identify sources of contamination or transport contaminants on a regional scale." While perched water areas may be too discontinuous to transport contaminants on a regional scale, the wells may still be used to identify sources of contamination. Therefore, Sections 4.5.1 and 10.1 must be revised to remove the statement that wells screened in perched water areas cannot be used reliably to identify sources of contamination.

Response

Agreed. Sections 4.5.1 and 10.1 have been revised to remove the statement that wells screened in perched water areas cannot be used reliably to identify sources of contamination.

9. U.S. EPA Comment

Page 27, Section 5.0, Site Model Development and Objectives (Step 1). According to A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems (EPA 2008), the first element of Step 1 is to verify whether the groundwater contaminant plume is adequately delineated in three dimensions. Adequate plume delineation is essential to establishing a meaningful target zone. Section 5.0 currently does not state whether the plume is adequately delineated in three dimensions; it must be revised to do so.

Response

Based upon a review of the historical groundwater analytical data, the plume is largely delineated in three dimensions for all of the COCs. Once the data gaps identified in the ICM Effectiveness Report are addressed, the need for future recommendations with respect to supplemental activities will be identified at that time. The groundwater investigation will continue to proceed in a phased approach in accordance with the RFI schedule.

10. U.S. EPA Comment

Page 27, Section 5.1.2, Historical Contaminants of Concern. Section 5.1.2 describes the current semiannual groundwater monitoring program but does not mention collection of groundwater samples from neighboring residential wells. Section 5.1.2 must be revised



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to include the collection of groundwater samples from neighboring residential wells.

Response

Agreed. Please see the response to Specific Comment number 3.

11. U.S. EPA Comment

Page 28, Section 5.1.2, Historical Contaminants of Concern. Section 5.1.2 provides a rationale for excluding chromium from the list of contaminants of concern (COC); however, no rationale is provided for excluding delta-benzene hexachloride (BHC). Section 5.1.2 must be revised to indicate why delta-BHC was not included as a COC.

Response

Section 5.1.2 has been revised to provide a rationale as to why delta-BHC was not included as a COC.

12. U.S. EPA Comment

Page 28, Section 5.1.2, Historical Contaminants of Concern, and Table 6, Chemicals of Focus Analysis Summary. Section 5.1.2 provides a list of historical COCs; however, this list does not match the Table 6 list of routine COCs. Specifically, vinyl chloride and 2,4,5-trichlorophenol are listed as routine COCs on Table 6 but are not listed in Section 5.1.2. Conversely, alpha-BHC is listed as a historical COC in Section 5.1.2 but it is not listed as a routine COC on Table 6. Both Section 5.1.2 and Table 6 must be revised to include the full list of historical COCs.

Response

Section 5.1.2 and Table 6 have been revised to reconcile the full list of COCs.

13. U.S. EPA Comment

Page 31, Section 5.4, Chemicals of Focus, and Page 27, Section 5.1.2, Historical Contaminants of Concern. Section 5.4 indicates that each chemical of focus (COF) was selected from the list of COCs if the COC was detected "at a concentration above the remedial objective more than 5 percent of the time for all of the reported results within the electronically compiled data set." This selection approach does not consider recent contaminant trends and has the effect of potentially eliminating recent, limited



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occurrences of a COC at elevated levels. The report must be revised to reconsider how COFs are selected so that recent, limited COC occurrences are not categorically excluded from COF consideration.

Response

Section 5.4 has been revised to include the rationale detailing why the few remaining COCs were not included on the COF list used for the trend analysis.

14. U.S. EPA Comment

Page 31, Section 5.5, Regional Hydraulic Stresses. Section 5.5 describes the hydraulic impact of regional production and irrigation wells; however, the aquifers in which these wells are screened are not consistently identified. Furthermore, when the aquifer is identified, the identifier is not always consistent. For example, WW12 is identified as being screened in "the deepest aquifer," but whether "the deepest aquifer" refers to the S1 aquifer, the underlying bedrock, or something else entirely is unclear. Section 5.5 must be revised to clearly and consistently identify the aquifer in which each production or irrigation well is screened.

Response

Section 5.5 has been revised to clearly and consistently identify the aquifer in which each production or irrigation well is screened to the extent this information is known. The production and irrigation wells were installed by water well drillers. Stratigraphic samples likely were not collected during borehole advancement. Moreover, stratigraphic descriptions are likely based on driller observations.

15. U.S. EPA Comment

Page 35, Section 7.0, Groundwater Flow Evaluation (Step 3). Section 7.0 states, "the groundwater flow regime is relatively consistent over time." However, the facility location is subject to seasonal fluctuations in groundwater recharge. Section 5.5 indicates that regional groundwater flow is heavily influenced by numerous industrial, irrigation, and other production wells. No comparison of groundwater flow regimes is provided to verify the statement in Section 7.0 or to demonstrate the impact of seasonal variations (in pumping rates or recharge) on the groundwater flow regime. Additionally, figures associated with groundwater flow evaluation present data for only one monitoring event. Section 7.0 must be revised to account for seasonal variations in recharge and pumping.



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Response

Agreed. Additional groundwater contour maps from several different monitoring periods have been included in an appendix to the revised report, and Section 7.0 has been revised accordingly.

16. U.S. EPA Comment

Page 35, Section 7.1, Horizontal Flow. Section 7.1 discusses groundwater contour mapping but does not indicate the software name and settings, specific algorithms applied, location and values for assumed data values selected to augment measured data, or assumed or applied data distribution models (including trends and transformations) as recommended in A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems (EPA 2008). Section 7.1 must be revised to include this information, in accordance with EPA's 2008 capture zone evaluation guidance.

Response

In an effort to ensure that appropriate professional judgment was applied, the groundwater contours were hand drawn by an experienced geologist, scanned, and drawn in CADD. Since a number of the interceptor wells did not have water level monitoring points in close proximity to the wells, computer (e.g., Surfer™) contouring was not used. Once this data gap is rectified (as recommended by the ICM Effectiveness Report), computer-generated contouring programs may be used to provide a useful tool to develop an accurate representation of the groundwater surface.

17. U.S. EPA Comment

Page 36, Section 7.1.1, S1 Aquifer, and Figure 21. Section 7.1.1 and Figure 21 indicate that groundwater flow is radial toward the interceptor wells. However, the 1240- to 1246-foot contours at interceptor wells IW-29 and IW-36 are inaccurately drawn based on the measured water levels at monitoring wells MW029S1 and MW114S1. This representation may exaggerate the extent of horizontal capture. Capture zone determinations should be determined based on water level data from monitoring wells, or piezometers located near the extraction wells rather than from the extraction wells themselves, which may have lower water levels than the rest of the aquifer as a result of well inefficiency or loss (EPA 2008). Figure 21 must be revised to reflect known aquifer water level data, and Section 7.1.1 and later determinations of capture must be revised to reflect these data. Additionally, when new piezometers are installed at the facility, OCC must use their water level data to reevaluate capture.



Response

Figure 21 has been revised to remove the inferred groundwater elevations at the extraction wells.

18. U.S. EPA Comment

Page 36, Section 7.1.2, S2/S3 Aquifer, and Figure 22. Section 7.1.2 and Figure 22 indicate that groundwater flow is radial toward the interceptor wells. However, the 1254- to 1256-foot contours at interceptor wells IW-30, IW-31, IW-32, IW-35A, and IW-35B are inaccurately drawn based on the measured water levels at monitoring wells MW012S3 and MW113S3. Additionally, the 1256- and 1258-foot contours around interceptor well IW-41 and the 1258-foot contour around interceptor IW-42 are assumed without any supporting water level data. This representation may exaggerate the extent of horizontal capture. Capture zone determinations should be determined based on water level data from monitoring wells, or piezometers located near the extraction wells rather than from the extraction wells themselves, which may have lower water levels than the rest of the aquifer as a result of well inefficiency or loss (EPA 2008). Figure 22 must be revised to reflect known aquifer water level data, and Section 7.1.2 and later determinations of capture must be revised to reflect these data. Additionally, when new piezometers are installed at the facility, OCC must use their water level data to reevaluate capture.

Response

Figure 22 has been revised to remove the inferred groundwater elevations at the extraction wells.

19. U.S. EPA Comment

Page 38, Section 8.0, Hydrogeologic Calculations (Step 4). Section 8.0 states, "calculated capture zones are used in conjunction with other lines of evidence in the evaluation process." Evaluation of additional evidence is essential to supplement simple horizontal capture analyses, given that transient conditions (e.g., seasonal water level fluctuations) and off-site stresses (e.g., neighboring pumping wells) affect the aquifers beneath the facility (EPA 2008). No documentation of the additional evidence evaluated or the evaluation outcomes is provided in the report, and the report must be revised to discuss them.



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Response

Consistent with the six step approach (EPA 2008) the hydrologic calculations represent one of the lines of evidence used to evaluate capture. The other lines of evidence used to evaluate capture presented in the report included:

- development of a conceptual hydrogeologic model,
- identifying a target capture zone,
- interpreting groundwater flow conditions (horizontal and vertical),
- calculation of groundwater flux,
- completing contaminant concentration trend evaluations, and
- interpreting these lines of evidence collectively and identifying any data gaps.

20. U.S. EPA Comment

Page 38, Section 8.1.1, Site-Wide Parameter Estimates. Section 8.1.1 references aquifer tests and groundwater modeling studies completed by Camp Dresser & McKee (1997), Petroteck (1997), and Woodward Clyde Consultants (1990, 1991). The reports referenced are not included in the EPA Region 7 records. See EPA's response to specific comment #4.

Response

Copies of the referenced reports were provided to the U.S. EPA on May 12, 2009 by OCC.

21. U.S. EPA Comment

Page 40, Section 8.2.1.1, S1 Aquifer. Section 8.2.1.1 references an average aquifer thickness of 10 feet; however, cross sections shown in Figures 12 through 18 indicate an average aquifer thickness closer to 15 feet in most cases. Similarly, Appendix C (pages 3 and 5) indicates that the mid-range aquifer saturated thickness southeast of IW-29 (MW-012) is 15 feet and at IW-36 is 14 feet. Section 8.2.1.1 must be revised to indicate an accurate aquifer thickness, consistent with the cross sections in Figures 12 through 18 and the aquifer thicknesses determined on pages 3 and 5 of Appendix C.



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Response

Agreed. Section 8.2.1.1 has been amended to use the more conservative average aquifer thickness of 15 feet.

22. U.S. EPA Comment

Page 43, Section 9.0, Concentration Trend Evaluation (Step 5). Section 9.0 indicates that a concentration trend evaluation was conducted using the first semi-annual groundwater sampling event for the years 1996, 2001, 2006, and 2009. No rationale is provided for selecting the concentration from the first semi-annual groundwater sampling event rather than the maximum concentration from the entire year. Section 9.0 must be revised to reevaluate contaminant trends using maximum concentrations detected, or to justify the decision to use only concentrations from the first semi-annual groundwater sampling events.

Response

The rationale for the concentration trend evaluation was to use historical analytical data to visually depict a snapshot chronology of the contaminant plume over a 5-year cycle. In order to ensure that an accurate comparison of relative concentration changes at different time intervals was undertaken, the review focused on the reported concentration for the first semi-annual event for each time period reviewed. Since all of this was undertaken to evaluate relative changes, the second semi-annual event could also have been selected. Future effectiveness analyses will focus on more current hydraulic influences and seasonal variances, and more recent trend analysis to better evaluate current operational effects.

23. U.S. EPA Comment

Pages 43 to 64, Section 9.0, Concentration Trend Evaluation (Step 5). In several subsections within Section 9.0, stability over time is assumed for wells lacking pre-2009 analytical data. Absence of data is insufficient justification to presume stability, and additional data (either existing data from other years or data to be collected) must be compiled and evaluated to determine plume stability.

Response

In Section 9.0, the areas where the lack of pre-2009 analytical data are identified mainly refers to monitoring wells nests MW-18, MW-19, MW27, and MW-114S1. The lack of



data from these monitoring wells is due to the reported presence of DNAPL at these locations. These monitoring wells are located within the actual facility boundaries and are noted in the report as being within contaminant source areas. Therefore, the general assumption of stability over time is not incorrect, and this statement does not infer that the well was not contaminated or that these wells were used to define the limits of a plume. In the few other instances, the lack of analytical data is due to the well being dry (MW11S3B) or that the well had yet to be installed (IW-36, MW02S3SS, MW29S3, MW130S1, and MW132S1). As indicated in response to comment 22, additional data will be collected, compiled, and evaluated to confirm plume stability.

24. U.S. EPA Comment

Page 44, Section 9.1.1, Total Chlorinated Ethenes, and Appendix D, Figures D.1 and D.2. Section 9.1.1 and Figures D.1 and D.2 present isoconcentration contours at 10 micrograms per liter ($\mu\text{g/L}$) for total chlorinated ethenes. The isoconcentration value used exceeds the maximum contaminant level (MCL) for each of the compounds included in total chlorinated ethenes—tetrachloroethene (PCE, $5 \mu\text{g/L}$), trichloroethene (TCE, $5 \mu\text{g/L}$), and vinyl chloride ($2 \mu\text{g/L}$). Furthermore, it is unclear why the $10 \mu\text{g/L}$ threshold was selected. Section 9.1.1 must be revised to justify the selection of the isoconcentration contour value or to replace the $10 \mu\text{g/L}$ contour value with a value that will allow concentrations below and above MCLs to be depicted.

Response

The Total Chlorinated Ethenes figures have been re-contoured at $5 \mu\text{g/L}$.

25. U.S. EPA Comment

Page 47, Section 9.1.4, Chlorinated Methanes, and Appendix D, Figures D.7 and D.8. Similar to the above comment, Section 9.1.4 and Figures D.7 and D.8 present isoconcentration contours at $10 \mu\text{g/L}$ for total chlorinated methanes. The isoconcentration value used exceeds the MCL for the two chlorinated methanes with MCLs established—carbon tetrachloride ($5 \mu\text{g/L}$) and methylene chloride ($5 \mu\text{g/L}$). Again, it is unclear how the $10 \mu\text{g/L}$ threshold was selected. Section 9.1.4 must be revised to justify the selection of the isoconcentration contour value or to replace the $10 \mu\text{g/L}$ contour value with a $5 \mu\text{g/L}$ contour value.

Response

Please see the response to Specific Comment number 24. The relevant figures have been



reproduced using a 5 µg/L threshold.

26. U.S. EPA Comment

Page 50, Section 9.1.6, Chloroform (CHCl₃), and Appendix D, Figure D.7. Section 9.1.6 states, "the extent of the CHCl₃ contours at the MCL of 70 µg/L is also reduced in size relative to the chlorinated methane contours in the S1 sand unit." The section should be revised to indicate that chloroform does not have an MCL. Although concentrations of this constituent have decreased within the source area, the extent of the chloroform contours is less than that of the total chlorinated methane plume primarily because the contour interval has changed from 10 µg/L for total chlorinated methanes to 70 µg/L for chloroform. If the contour interval was left at 10 µg/L, the contours would extend northeast along the railroad corridor which is similar to the total chlorinated methanes contours. The statement regarding chloroform contours is misleading and should be removed from the text.

Response

Agreed. Section 9.1.6 has been revised and the statement regarding the chloroform contours has been clarified.

27. U.S. EPA Comment

Page 52, Section 9.1.7, Methylene Chloride (CH₂Cl₂). Section 9.1.7 states, "an elevated CH₂Cl₂ concentration was observed in 1996 (66,600 µg/L)." The elevated methylene chloride concentration (66,600 µg/L) was actually observed in 2006, not 1996. Section 9.1.7 must be revised to reference the correct year.

Response

Agreed. Section 9.1.7 has been revised to reference the correct year.

28. U.S. EPA Comment

Page 63, Section 9.3.5, 2,4-Dichlorophenoxyacetic Acid (2,4-D). Section 9.3.5 indicates that isoconcentration maps were not generated for 2,4-D because groundwater samples were analyzed for this parameter in 2008 and 2009 only. Section 9.3.5 must be revised to include isoconcentration maps for 2,4-D in 2009 as a baseline, as with other chemicals in the concentration trend evaluation.



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Response

Agreed. Section 9.3.5 has been revised to include an isoconcentration map for 2,4-D in 2009 as a baseline.

29. U.S. EPA Comment

Pages 66 and 67, Section 10.3, Step 3 Evaluations. Section 10.3 evaluates water level data to determine the extent of capture. Based on changes to the text, tables, figures, and appendices (especially Sections 7.1.1, 7.1.2, and 8.2.1.1; Figures 21 and 22; and Appendix C), the Step 3 evaluation must be reassessed. Section 10.3 must be revised to reflect any changes in the outcome of the Step 3 evaluation.

Response

Please see the response to Specific Comment numbers 16, 17 and 18. Further evaluation of the extent of capture will be conducted following implementation of OCC's recommendations and future hydraulic data collection.

30. U.S. EPA Comment

Pages 71 and 72, Section 11.1, Proposed Groundwater Monitoring Program; Tables 9, 10, and 11; and Figures 27 and 28. Because these technical review comments require changes expected to impact contaminant trend and capture zone evaluation at the facility, the proposed groundwater monitoring program will be reviewed after these comments have been addressed.

Response

Understood. The recommendations for the proposed ongoing groundwater monitoring program will be submitted to the EPA in a separate report.

31. U.S. EPA Comment

Table 9, Proposed Semi-Annual Groundwater Sampling Program. Table 9 lists monitoring wells MW26S1 and APMW302S1 twice. It is unclear whether these duplicate listings should be replaced with other monitoring wells or deleted. Table 9 must be revised to correctly list the S1 aquifer monitoring wells.



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Response

The recommendations for the proposed ongoing groundwater monitoring program will be submitted to the EPA in a separate report.

32. U.S. EPA Comment

Table 10 lists monitoring well MW137S2 as screened in the S1 sand unit and monitoring well MW138S1 as screened in the S2/S3 sand unit. The sand units ascribed to these wells appear to contradict the sand units in which these monitoring wells were intended to be installed. Table 10 must be revised to correct the sand units attributed to monitoring wells MW137S2 and MW138S1, or confirmation must be provided that these sand units are correct.

Response

Stratigraphic information from the well stratigraphic logs and groundwater elevation data was thoroughly evaluated to develop three dimensional interpretations of the subsurface conditions on a regional scale. This stratigraphic information was used to develop the geologic cross-sections presented on Figures 12 through 18 in the report. Figure 14, Geologic Cross-Section C-C', provides the rationale used to re-categorize monitoring well MW137S2 as being screened in the S1 sand unit. The two draft figures attached to this letter provide the rationale used to re-categorize monitoring well MW138S1 as being screened in the S2/S3 sand unit. The recommendations for the proposed ongoing groundwater monitoring program will be submitted to the EPA in a separate report.



33. U.S. EPA Comment

Appendix C, Capture Zone Calculations. Appendix C indicates that mid-range saturated thicknesses for the S1 aquifer are 15 feet to the southeast of IW-29 (MW-012) and 14 feet at IW-36 (see Appendix C, pages 3 and 5). However, the groundwater flux calculation for the S1 aquifer (see Appendix C, page 17) assumes an aquifer thickness of 10 feet. Appendix C must be revised to recalculate groundwater flux for the S1 aquifer using an aquifer thickness of 15 feet.

Response

Please see the response to Specific Comment number 21.

34. U.S. EPA Comment

Appendix C, Capture Zone Calculations. A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems (EPA 2008), indicates that the hydraulic gradient value used in groundwater flux and capture zone calculations should be the regional hydraulic gradient, without the influence of remedial pumping. However, the hydraulic gradients calculated in Appendix C are based on current water level measurements, which are influenced by the interceptor well system. Although an attempt was made to measure hydraulic gradient at points distant from the facility, exact measurement locations were difficult to determine, and calculations were difficult to recreate. A more realistic gradient measurement might be obtained from the pre-pumping groundwater contour maps for the facility. Appendix C must be revised to recalculate groundwater flux and capture zones using hydraulic gradients obtained from pre-pumping groundwater contour maps for the facility to better define and defend current measurements of hydraulic gradient.

Response

The horizontal hydraulic gradient used in the report was the best approximation of the actual range of possible gradients. The pre-pumping contour maps are from the 1950s and do not provide information on the depths of the wells or the aquifer in which the wells are screened.



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Should you have any questions on the above, please do not hesitate to contact us.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

A handwritten signature in blue ink, appearing to read 'B. Clegg', is positioned above the name 'Bruce Clegg'. The signature is stylized with a large initial 'B' and a long, sweeping underline.

Bruce Clegg

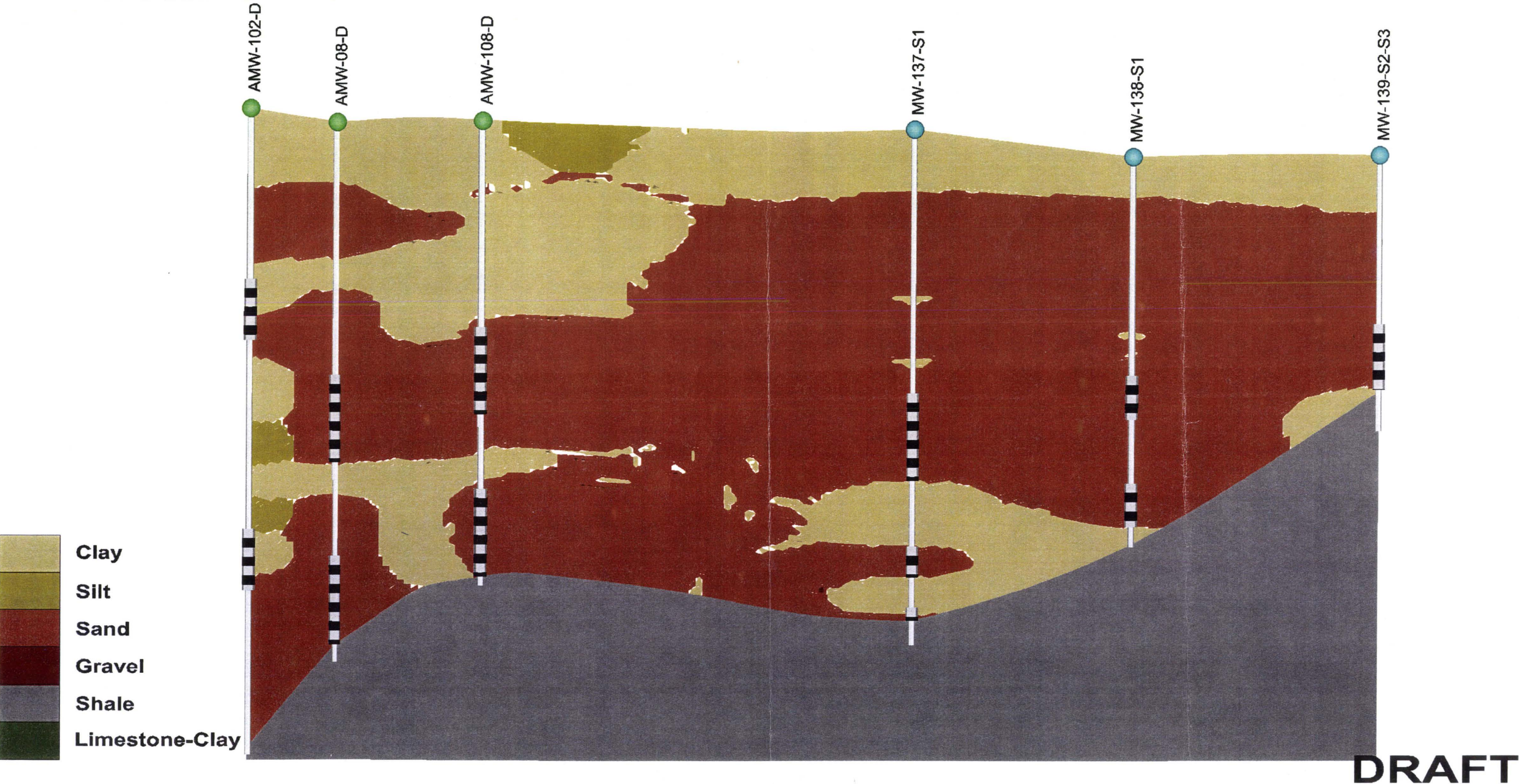
BCC/lg/12

c.c.: Juan Somoano, OCC
Lisa Thurman, OCC
Walt Pochron, CRA
Mike Keppel, CRA

GEOLOGIC CROSS-SECTION

Section: G - G'

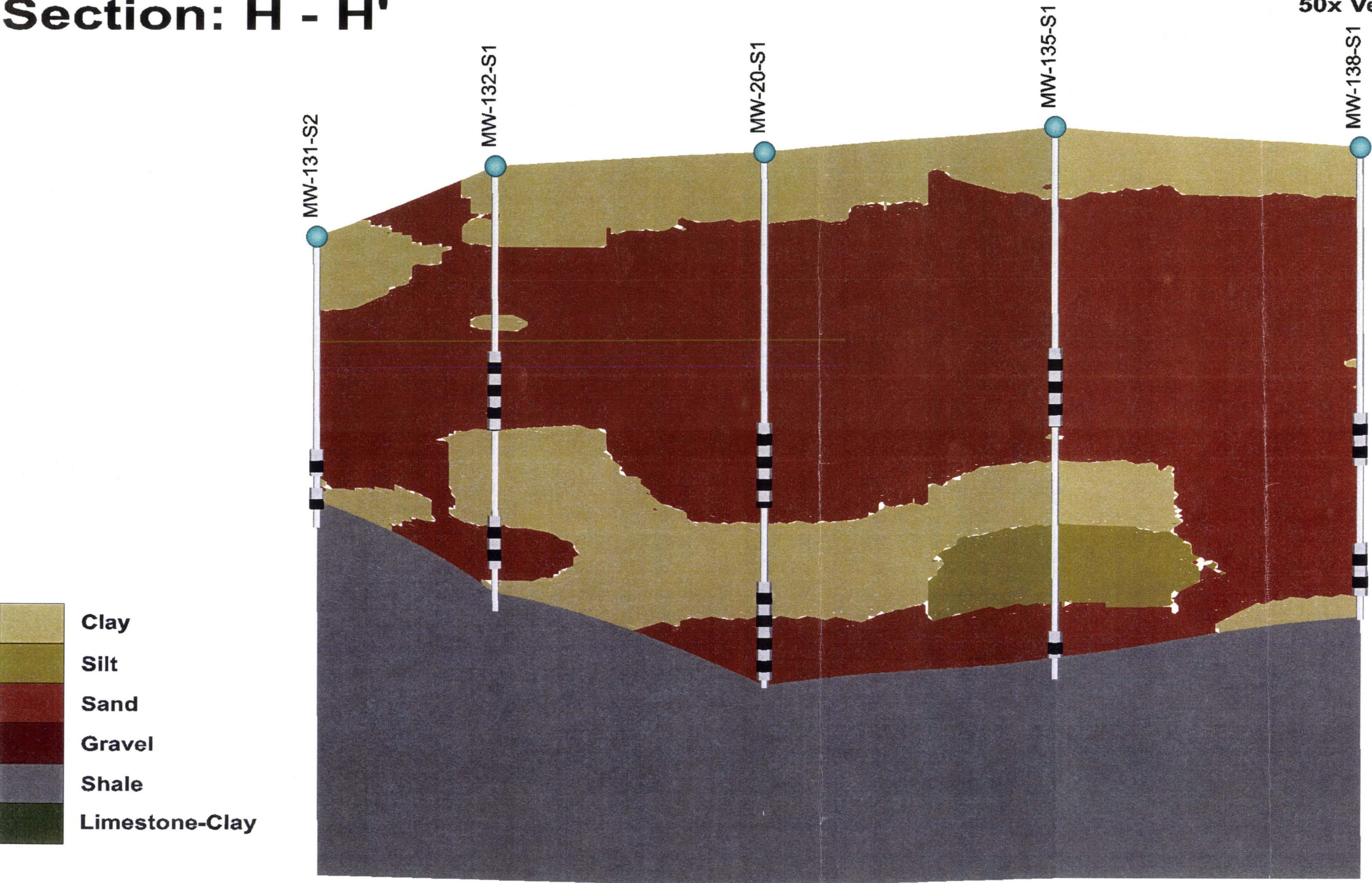
Occidental Chemicals Corporation
Wichita, KS
50x Vertical Exaggeration



GEOLOGIC CROSS-SECTION

Section: H - H'

Occidental Chemicals Corporation
Wichita, KS
50x Vertical Exaggeration



DRAFT